Citect for Windows

Driver Specification

MooreP Driver

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JO Reyes	26/7/01	Minor updates to doco

Contents

1. Target Device(s) and Protocol

1.1 Introduction

This driver interfaces Citect to the MYCRO Model 320 Independent Computer Interface (ICI). The Model 320 ICI allows the computer to communicate and share data with any device on the Local Instrument Link (LIL). The Model 320 ICI has two versions BBA and BCA. Version BCA is newer and has three new commands. This driver will support version BCA only.

The LIL is a communication network which connects a group of stations such as Model 351 Triple-Loop Digital Controller (TLDC), Model 352 Single-Loop Digital Controller (SLDC), Model 321 Expansion Satellite (LES), Model 324 Programmable Sequence Controller (PSC), Model 382 Logic and Sequence Controller (LSC), and Model 383 Multi-Point Display Station (MDS).

This driver will be based on the Front-end / back-end driver model. This is due to the relatively slow communications and also to give the driver the ability to handle either setting of the 'Link Acknowledge Delay'.

This driver will not handle unsolicited requests or records at this stage, although the architecture of the front-end/back-end design will make future inclusion possible.

1.2 Device Manufacturer

Moore Products Co.

1.3 Device Definition

Model 320 ICI allows the computer to communicate with any device on the LIL using the serial ports.

1.4 Communications Method

The ICI is based on the RS-232C serial data communication standard. The ICI is also optionally configurable for a RS-422 asynchronous version.

1.5 Communications/Hardware Configuration

Detailed diagrams and tables are available in the ICI User's Manual.

1.5.1 Wiring Diagrams

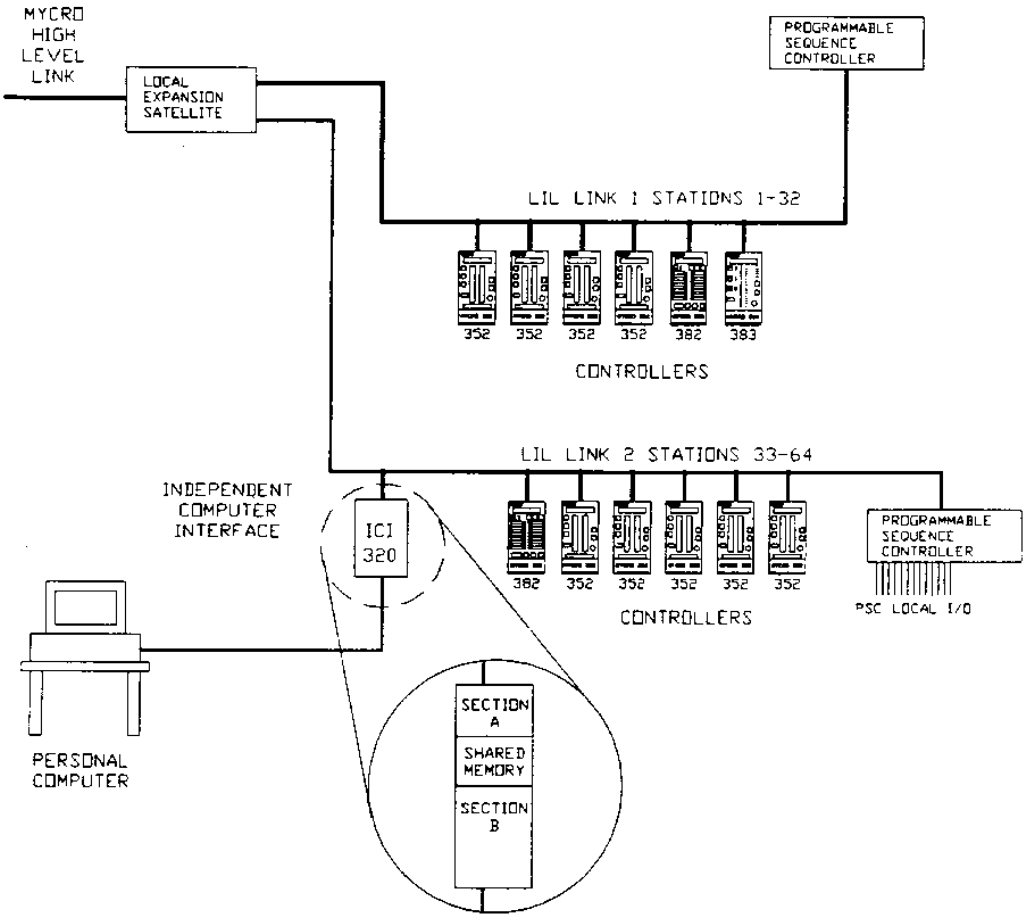

FIGURE 6-1

AS-2032-1
Local Instrument Link System

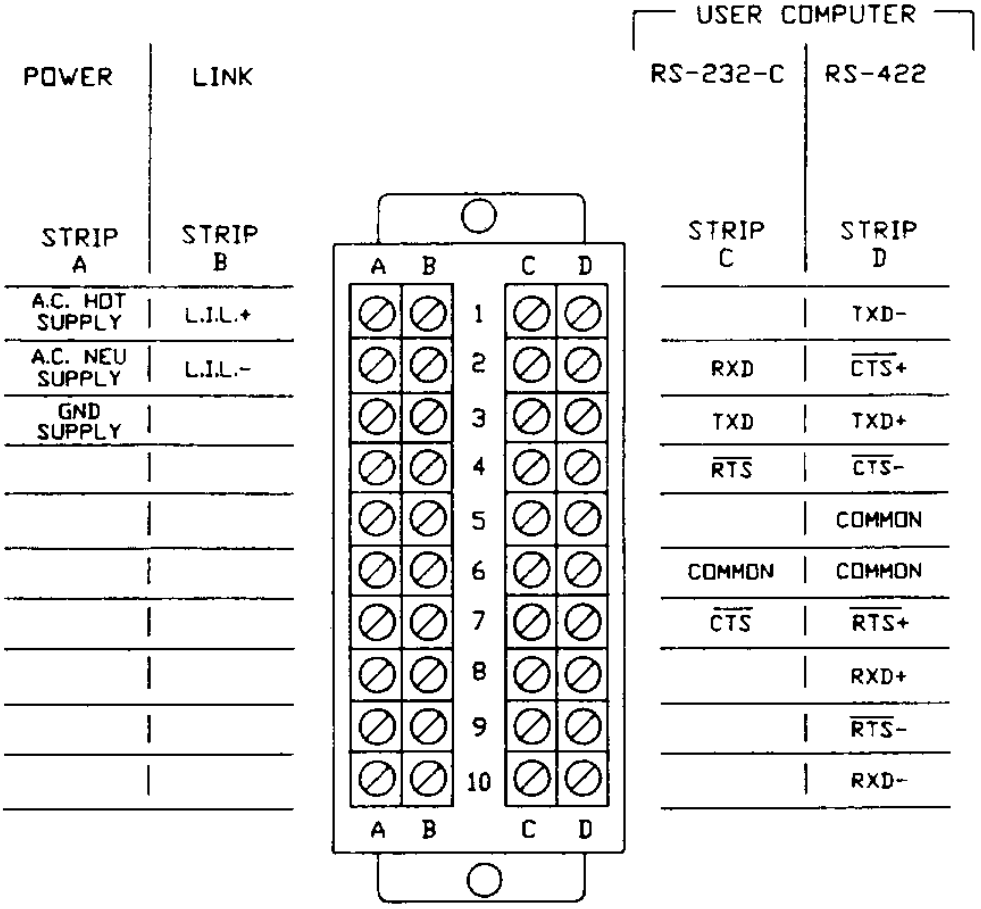

FIGURE 6-2

AS-2032-2
Rear Termination Strips Of ICI

1.5.2 I/O Device Settings

Switch/Jumper settings are required for selecting serial port configuration, baud rate, link address, transmission method. The default settings for the ICI are as follows:

	Default Value	Switch/Jumper	Setting
Serial Port Board			
Data Format	8 data bits	SW2-8	OFF
	NO parity	SW2-4	ON
Link Address	1	SW2-2	ON
		SW2-1	ON
		SW1-8	ON
		SW1-4	ON
		SW1-2	ON
		SW1-1	ON

Port Configuration	RS-232C	W5	2-3
		W6	2-3
Computer Port Baud Rate	9600	W7	3-12
Diagnostic Port Baud Rate	9600	W8	2-7
MPU Baseboard			
Transmission Method	Binary	SW5	ON
Link Acknowledge Delay	Enabled	SW4	OFF
Null-filled Data	Enabled	SW3	OFF
Send Command Security	None	SW2	ON
		SW1	ON
Cable Adapter Board			
DS CTS Line Select	DTR	W1	4
DS CTS Line Select	DSR	W2	4

AD320-10

LIL ADDRESS SELECTION
(MINUS 1)

SWITCH	VALUE
SW2-2	32
SW2-1	16
SW1-8	8
SW1-4	4
SW1-2	2
SW1-1	1

DATA FORMAT SELECTION

SW2-8	SW2-4	START BITS	DATA BITS	PARITY	STOP BITS
ON	ON	1	7	EVEN	1
ON	OFF	1	7	ODD	1
* OFF	ON	1	8	NONE	1
OFF	OFF	1	8	ODD	1

* = DEFAULT

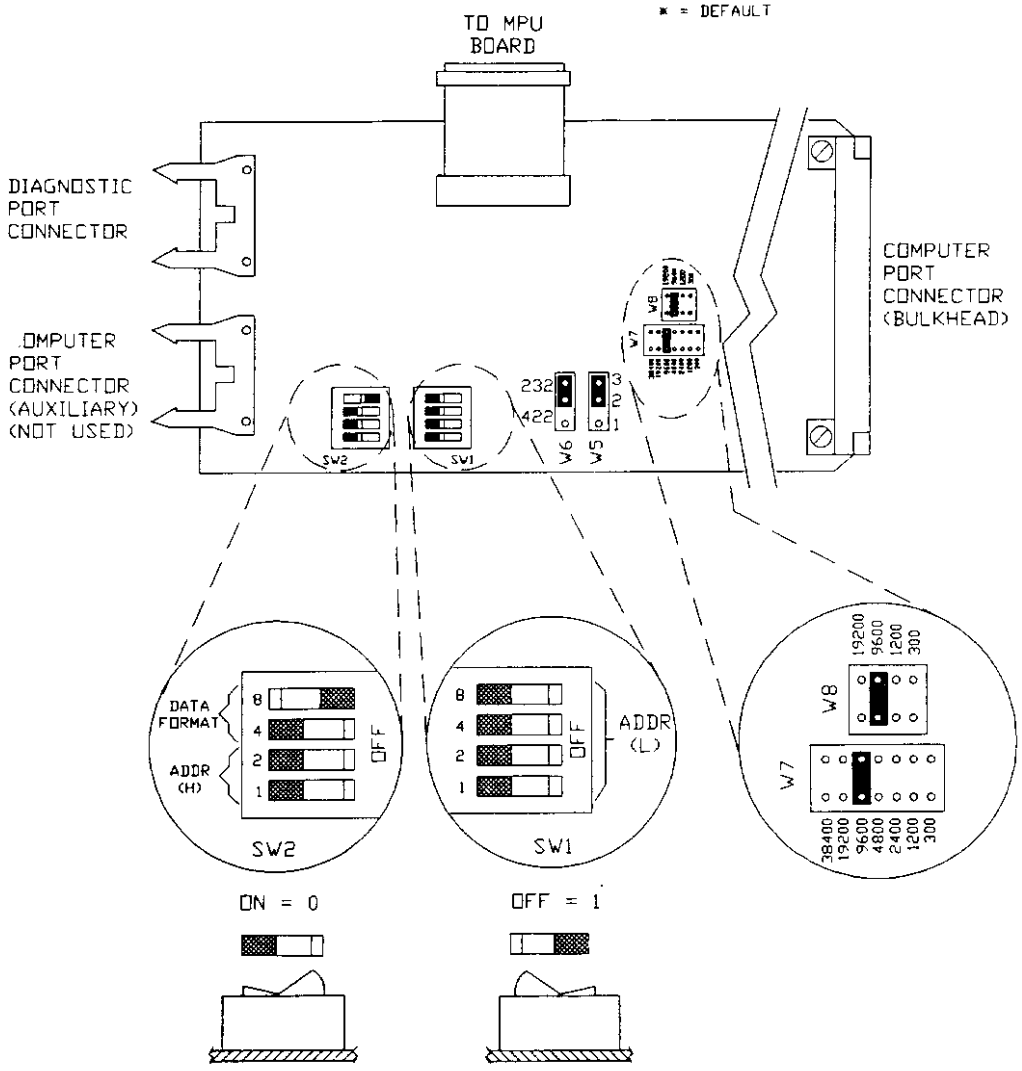

FIGURE 6-3
AS-2032-3
Serial Port Board

Refer to the Model 320 LIL ICI User's Manual Appendix L for more details.

1.5.3 Software Setup

Stations on the LIL have to be configured by the user using the Configuration Management Software supplied by Moore Products Co. (Details not available - Test hardware was pre-configured)

1.6 Special Requirements

None.

1.7 Maximum Request Length

256 bytes.

2. User Interface

2.1 Introduction

This section defines how the user will see the driver. This relates directly to how the Citect forms need to be filled out and any special INI options. For the kernel, the debug trace messages and the Stats.Special counters are documented.

2.2 Driver Name

MOOREP

2.3 Boards Form

2.3.1 Board Type

COMX

2.3.2 Address

0

2.3.3 IO Port

Not used.

2.3.4 Special Opt

Not used.

2.4 Ports Form

2.4.1 Baud Rate

Can be set to 300, 1200, 2400, 4800, 9600, 19200, or 38400.

2.4.2 Data Bits

Can be set to 7 or 8. This should be set to 8 as this is the default for the ICI.

2.4.3 Stop Bits

1

2.4.4 Parity

Can be set to Even, Odd, or None. This should be set to None as this is the default for the ICI.

2.4.5 Port Number

COM port number to which ICI is attached.

2.4.6 Special Opt

Not used.

2.5 IO Devices Form

2.5.1 Protocol

MOOREP1	for the ICI
MOOREP2	for general addressing independent of Model.
MOOREP352	for future use (Model 352 SLDC)
MOOREP382	for future use (Model 382 LSC)
MOOREP383	for future use (Model 383 MDS)

2.5.2 Address

H.L.S

where

H	Any number from 0 to 31 is a valid Hi-Level Link Address.
L	Any number from 0 to 4 is a valid Link Number.
S	Any number from 1 to 64 is a valid LIL Station Address.

For example, **1.2.5** would refer to Station address 5, on Link number 2, on Hi-Level Link 1.

2.6 Pulldown lists Help

The following entries should be included in the Citect Help.DBF spec file.

TYPE	DATA	FILTER
PROTOCOL	MOOREP1	
PROTOCOL	MOOREP2	

2.7 IO Device Variable Types

The protocol may communicate with many different types of devices on the Local Instrument Link. Variables within each type of device can be accessed using a generic addressing format provided by the protocol, however specific addresses have certain meanings for each type of device. For example, the Model 352 Loop controller has a variable “Proportional Gain” which is stored in channel 6, parameter 2 of the unit. To avoid the user of Citect having to know this, additional driver specification files (*driver*.dbf) are created for each case in addition to the general addressing scheme.

Also, The ICI unit behaves as any other station on the LIL. It contributes channels to the LIL global database. However, the information available in the ICI is accessed differently, or may be specific to the ICI and not available in normal stations on the LIL. In this case a separate DBF is provided for the ICI itself.

2.7.1 ICI variable types

IO Device Type	Citect data type	Citect data format	Description/Special Usage/Limitations

Local channel in ICI	Integer	LCx	Read/Write. The local channel is contributed to the LIL global database by the ICI approx every 0.5secs.
Bit in local channel in ICI	Digital	LCx.z	Read/Write. The local channel is contributed to the LIL global database by the ICI approx every 0.5secs.
Status word	Integer	STW	Read Only.
Status bits	Digital	STWz	Read Only.

Where

x Channel number (1-256)
z Bit number in word (0-15)

2.7.2 General addressing variable types

IO Device Data Type	Citect data type	Citect Data types	Description/Special Usage/Limitations
Channel from LIL Global database	Integer	Cx	Read/Write. This datatype is the first parameter of the channels contributed to the LIL global database approx every 0.5secs.
Bit in channel from LIL Global database	Digital	Cx.z	Read/Write. This datatype is the first parameter of the channels contributed to the LIL global database approx every 0.5secs.
Parameter	Integer	CxPy	Read/Write. Parameters not part of the LIL global database are accessed through this datatype.
Bit in parameter	Digital	CxPy.z	Read/Write. Parameters not part of the LIL global database are accessed through this datatype.

Where

x Channel number (1-256)
y Parameter number (1-256)
z Bit number in word (0-15)

2.8 PROTDIR.DBF

TAG	FILE	BIT_BLOCK	MAX_LENGTH	OPTIONS
MOOREP1	MOOREP	2048	2048	0x03
MOOREP2	MOOREP	2048	2048	0x03

2.9 Parameters and INI options

2.9.1 Standard Parameters

Block	256
Delay	0
MaxPending	2
Polltime	20
Timeout	1000
Retry	1
WatchTime	30000

2.9.2 Driver Specific Parameters

[MOOREP]

LocalICIChannelAmount	On startup, a command is sent to the ICI detailing the number of channels the ICI will contribute to the LIL database. Default=6
WatchDog	If defined, a command is sent to the ICI on startup setting the Watchdog time.

2.10 Driver Specific Errors

The following errors are listed in Appendix D of the LIL ICI manual.

Driver Error Code (Hexadecimal)	Mapped to (Generic Error label)	Meaning of Error Code
50	No_Buffers	Record request buffer not empty
51	Invalid_Data	Data not ready
52	No_Buffers	Input buffers not empty
53	General_Error	Unsolicited record available
54	Unit_Offline	LIL interface offline
55	Cannot_Read	Read not supported this UnitType/Command
80	Unit_Timeout	Timeout between characters
81	Invalid_Data_Fmt	Invalid data or bad character
82	Invalid_Command	Invalid command
83	Invalid_Command	Invalid request
84	General_Error	Word count error
85	General_Error	Checksum error
86	Msg_Overrun	Message overflow
87	General_Error	Parity or framing error
88	General_Error	Transfer prevents command execution
89	General_Error	Station not in global database
8A	Invalid_Data	Data not available
8B	No_Buffers	Local link buffers full
8C	General_Error	Global database not ready

8D	Unit_Timeout	Link command timeout
90	General_Error	LIL - Link not present
91	Hardware_Error	LIL - On-Board Dual-Port RAM failure
92	Hardware_Error	LIL - Local RAM failure
93	Hardware_Error	LIL - ROM check failure
94	Hardware_Error	LIL - Link physical interface failure
97	Hardware_Error	LIL - Off-Board Dual-Port RAM failure
99	Hardware_Error	ICI - Buffer RAM failure
9A	Hardware_Error	ICI - Local RAM failure
9B	Hardware_Error	ICI - ROM check failure
9C	Hardware_Error	ICI - Piggyback board failure
9D	Unit_Timeout	ICI - Receive timeout
9E	Unit_Timeout	ICI - Transmit timeout
A1	General_Error	Transmission problem, command not received
A2	No_Buffers	Destination buffers full, command not received
A3	Unit_Offline	Destination station offline, command not sent
A4	Unit_Offline	Gateway offline, command not sent
A5	General_Error	Link command checksum error, command not sent

2.11 Driver Error Help

The following entries should be included in the Citect ProtErr.DBF spec file.

PROTOCOL	MASK	ERROR	MESSAGE
MOOREP	0	50	Record request buffer not empty
MOOREP	0	51	Data not ready
MOOREP	0	52	Input buffers not empty
MOOREP	0	53	Unsolicited record available
MOOREP	0	54	LIL interface offline
MOOREP	0	55	Read not supported this UnitType/Command
MOOREP	0	80	Timeout between characters
MOOREP	0	81	Invalid data or bad character
MOOREP	0	82	Invalid command
MOOREP	0	83	Invalid request
MOOREP	0	84	Word count error
MOOREP	0	85	Checksum error
MOOREP	0	86	Message overflow
MOOREP	0	87	Parity or framing error

MOOREP	0	88	Transfer prevents command execution
MOOREP	0	89	Station not in global database
MOOREP	0	8A	Data not available
MOOREP	0	8B	Local link buffers full
MOOREP	0	8C	Global database not ready
MOOREP	0	8D	Link command timeout
MOOREP	0	90	LIL - Link not present
MOOREP	0	91	LIL - On-Board Dual-Port RAM failure
MOOREP	0	92	LIL - Local RAM failure
MOOREP	0	93	LIL - ROM check failure
MOOREP	0	94	LIL - Link physical interface failure
MOOREP	0	97	LIL - Off-Board Dual-Port RAM failure
MOOREP	0	99	ICI - Buffer RAM failure
MOOREP	0	9A	ICI - Local RAM failure
MOOREP	0	9B	ICI - ROM check failure
MOOREP	0	9C	ICI - Piggyback board failure
MOOREP	0	9D	ICI - Receive timeout
MOOREP	0	9E	ICI - Transmit timeout
MOOREP	0	A1	Transmission problem, command not received
MOOREP	0	A2	Destination buffers full, command not received
MOOREP	0	A3	Destination station offline, command not sent
MOOREP	0	A4	Gateway offline, command not sent
MOOREP	0	A5	Link command checksum error, command not sent

2.12 Debug Messages

2.13 Stats Special Counters

Number	Label	Purpose/Meaning of this counter
0	TX	Number of messages transmitted
1	RX	Number of messages received
2	BAD CRC	Bad Checksum
3	BAD RSW	Bad RSW
4	DATA NOT READY	Data is not ready
5	DATA IN CACHE	Data is not in cache
6	DATA IN CACHE BUT OLD	Data is in cache but old
7	DATA NOT IN CACHE	Data is not in cache
8	BAD CACHE UPDATE",	Bad cache update
9	CACHE UPDATE ATTEMPT	Cache update attempt
10	BAD LENGTH	Bad length
11	BAD FLAG	Bad Flag
12	ADDING CACHE QUE	Adding cache queue
13	READING CACHE QUE	Reading cache queue
14	BUILD CMD CACHE	Building command cache
15	BUILD CMD NORMAL	Building command normal
16	REPLY FROM CACHE	Replying from cache
17	ALLOC CACHE ELEMENT	Allocating cache element
18	INVALIDATING CACHE ELEMENT	Invalidating cache element
19	BAD STATE	Response bad state

2.14 Hints and Tips

3. References

3.1 References

Model 320 Local Instrument Link Independent Computer Interface User's Manual

3.2 Contacts

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4. Appendix A - Abbreviations and Dfinitions

4.1 Abbreviations

The following is a list of abbreviations used in the descriptions of the commands and responses:

ABBREVIATION	DESCRIPTION	DATA VALUES	MEANING
ADDR	COMMAND ADDRESS INFORMATION		
BBBB	RECORD BYTE COUNT	0000-FFFE	0-65534
CC	CHANNEL NUMBER	00-FF	1-256
CCCC	RECORD DATA CHECKSUM	0000-FFFF	0-65535
CHW	ERROR CHECKWORD	0000-FFFF	0-65535
CMD	COMMAND WORD	01xx-FFxx	(1-255)xx
CMWC	COMMAND MESSAGE WORD COUNT	0002-FFFF	2-65535
DC	DATA TYPE/COMMAND TYPE	0-F*	0-15*
DEST	DESTINATION ADDRESS INFORMATION		
HH	HI-LEVEL LINK ADDRESS	00-1F	0-31
KK	RECORD SEND ACKNOWLEDGE ERROR CODE	00-FF	0-255
LL	LINK NUMBER	00-04	0-4
N	NUMBER OF ITEMS (PARAMETERS)	0-F	0-15
NN	NUMBER OF ITEMS (MISC)	00-FF	1-256
OO	OFFSET COUNT	00-FF	0-255
PP	PARAMETER NUMBER	00-FF	1-256
RBC	RECORD BYTE COUNT (BBBB)	0000-FFFE	0-65534
RDC	RECORD DATA CHECKSUM (CCCC)	0000-FFFF	0-65535
RMWC	RESPONSE MESSAGE WORD COUNT	0002-FFFF	2-65535
RRRR	RECORD NUMBER	0000-FFFF	0-65535
RSW	RESPONSE STATUS WORD	0000-FFFF	0-65535
SRC	SOURCE ADDRESS INFORMATION		
SS	LIL STATION ADDRESS	00-3F	1-65
xx	IRRELEVANT DATA		
XX	DATA VALUE (8-BIT)	00-FF	**
XXXX	DATA VALUE (16-BIT)	0000-FFFF	**
XXXXXXXX	DATA VALUE (32-BIT)	00000000-FFFFFFFF	**

* Each nibble

** The data values in the table commonly appear in the following formats:

A. 8-bit integer data.
B. 16-bit integer data representing analog values, single discrete values, or multi-discrete values.
C. 32-bit integer data representing analog values and multi-discrete values.
D. 32-bit floating point (using IEEE format) representing analog values.

4.2 Definitions

The following terms used throughout the remaining sections have the following meanings:

LIL—The MYCRO Local Instrument Link which provides a means of communication between stations connected to the LIL.

ICI—The Model 320 LIL Independent Computer Interface which consists of the Local Instrument Link Computer assembly and the interface assembly and operates as a station on the MYCRO Local Instrument Link.

LES—The Model 321 LIL Expansion Satellite which provides a means of communications between elements on the Hi-Level Link and stations on the Local Instrument Link and/or expands the LIL from 32 stations to 64 stations maximum.

PSC—The Model 324 Programmable Sequence Controller which primarily performs discrete logic and sequencing functions with batch sequencing language capabilities.

SLDC—The Model 352 Single-Loop Digital Controller which primarily performs regulating control functions.

LSC—The Model 382 Logic and Sequence Controller which primarily performs discrete logic and sequencing functions.

MDS—The Model 383 Multi-Point Display Station which provides local indication and alarming along with digital communication capabilities.

Link Interface Board—A circuit board assembly of the ICI which communicates with other devices of the LIL system (SLDC's, PSC's, etc.) over the Local Instrument Link.

Serial Port Board—A circuit board assembly of the ICI which communicates with the user's computer over the RS-232C link.

MPU Base Board—A circuit board assembly of the ICI which contains the microprocessor and associated components.

Station— Any stand-alone hardware element that resides on a Local instrument Link, such as a Single-Loop Digital Controller, Programmable Sequence Controller, ICI. Local Expansion Satellite, etc.
Channel—An addressable data element in a station connected to the LIL. Each LIL station may generate up to 256 channels.

Parameter—One of up to 256 data addresses associated with each channel that can be addressed by other LIL stations. The first parameter of each existing channel is updated periodically to the LIL in the global database.

Command—The transmission generated by the user's computer and sent to the ICI for the purpose of requesting or sending data.

Response—The returned data from the interface to the user's computer.

Computer—The user's general purpose computer which is connected to the ICI.